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Comparison of Hard X-ray Footpoint Fluxes and Areas in RHESSI Flares

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Asymmetry in hard X-ray flare loops has been observed for many years; this asymmetry has been suggested to be of magnetic origin, in that the degree of convergence of magnetic field lines controls the amount of electron trapping relative to precipitation. Melrose and White (1979) originally predicted that in double footpoint flares the footpoint with larger HXR flux should have less magnetic convergence. This means greater footpoint area, since magnetic flux is conserved. Until recently, it has been difficult to determine footpoint areas, even with fully resolved RHESSI imaging, but with the advent of HXR visibilities it is now possible to test this prediction. Our method is to forward fit model visibilities to observed HXR visibilities in selected flares at energies above 25 keV, where the footpoint emission generally dominates. In our selection of flares, we find that the correlation between footpoint HXR flux and area is excellent, which confirms the prediction. We present forward-fit and Clean images with quantitative error estimates, and summarize the technique in detail. We also provide preliminary estimates of the relative number of trapped and precipitating electrons and the mirror loss cone angles as a function of time and energy in a sample of flare events.

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